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POSSIBLE EFFECTS OF THE IMAGINAL TYPE OF THE SUBJECT ON APHASIC DISTURBANCES

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It is obviously of both great theoretical and practical importance that a scheme of exact localization of lesions which show symptoms in disturbances in speech be formulated. Probably one of the most complete of such localization schemas is that of Wernicke and Lichtheim.¹ We have not mentioned this particular schema because we hold to it but merely by way of illustration.

All of the views of strict localization have come lately under rather severe criticism. Let us briefly consider some of the criticisms that have been offered. Adolf Meyer,² who does not consider aphasia as a separate disease but merely as one of the intellectual disorders which happens to involve language, is only one of many to point out the fact that apparently similar lesions in the cerebral cortex show intensely different symptom complexes.

Wundt and Pierre Marie³ both show that with the presence of aphasic disturbances there is also a lowering of the general

¹ C. Wernicke, *Der aphasische Symptomencomplex*. Breslau, 1874. L. Lichtheim, *Aphasia*, *Brain*, VII, 1885, p. 437-ff.

² A. Meyer, *The Present Status of Aphasia and Apraxia*. *The Harvey Lectures*, 1909-1910, Philadelphia, 1910.

³ W. Wundt, *Grundzüge der Physiologischen Psychologie*. 5th Ed., Vol. I, 1902, p. 307ff. W. Wundt, *Völkerpsychologie*. Vol. I, 1900. P. Marie, *Revision de la question de l'aphasie*. *La Sem. Med.*, 1906, pp. 241, 493, 565.

intelligence. Similarly the variation in function from day to day, as has been recently shown by Franz,⁴ cannot be readily explained on the basis of the localization theories in the form in which they now exist.

Perhaps one of the most telling criticisms is that of Wundt in which he emphasizes the qualitative aspect of the loss of speech in progressive cases and in old age. The words for concrete objects,—such as proper names,—are the first to go. Somewhat more durable are the concrete verbs and most durable are the abstract ideas,—both nominal and verbal,—such as virtue, love, hate, have, become. And the absolutely last to be lost are the abstract particles and conjunctions. Wundt makes his criticisms largely on the basis of the findings of Kussmaul.⁵

Also Wundt criticises the Wernicke-Lichtheim, and with it all strict localization theories, in that they do not explain the facts of recovery of the speech function, either total or partial,—and the vicarious functioning of other centers which this recovery would involve. And finally many authors point to a number of apparently anomalous cases in the literature which are not explained adequately by any theory of strict localization.

It is certainly true that the theories of the strict localization of the language function,—we have merely taken the Wernicke-Lichtheim schema as an example,—do not adequately meet any or all of these criticisms in the form in which these theories now stand in the literature. One type of attempted explanation is on the basis of Charcot's⁶ insistence on individual differences. Charcot differentiated three types of individual,—the visual, auditory, and motor types.

We believe that Charcot was on the right track and that an extension of this concept will, when added to the theories of strict localization, adequately answer all of the criticisms enumerated above. During the last twenty years advances have been made in experimental psychology on the basis of which we have radically changed our concepts of both imaginal types and of the importance of language for thought.

For Charcot the three types were more or less hard and fast. An individual either employed, exclusively or almost exclu-

⁴ S. I. Franz, On Certain Fluctuations in Cerebral Function in Aphasics. *Jour. of Exper. Psychol.*, I, 1916, p. 355ff.

⁵ A. Kussmaul, Entgegnung die Aphasie betreffend. *Fort. d. Med.*, 1883.

⁶ J. M. Charcot. Des varieties de l'aphasie. *Progress Méd.*, 1883.

sively, visual images, or auditory images, or motor images in his thinking. The modern view, probably best expressed by Meumann,⁷ indicates that the individual may use a considerable number of modalities of imagery in his thinking and recalling, but that he habitually employs one or two with much greater frequency than the others. Probably the most frequent types are the mixed types in which more than one form or modality of imagery is habitually employed. Probably the type most frequently met with recalls concrete experiences in concrete visual terms in combination with recalling abstract experiences in motor verbal terms. From which it will be seen that we must make a distinction, not only in the modality which an individual habitually employs but also the distinction between the modality for recall of concrete and verbal materials.

Another fact that has been brought out by the experimental work in psychology is that there is a great difference between the sorts of imagery which we are capable of calling up voluntarily and the modalities of imagery which we actually employ in our ordinary everyday thinking and remembering. Hence the filling out of a questionnaire such as that employed by Galton,⁸ while it gives a picture of what the actual imaginal endowment may be, does not give an adequate and, indeed, gives an erroneous picture of the kinds of all these possible images that are actually employed in meeting and solving the problems of daily life.

Galton, himself, was impressed by still another fact, the frequent use of verbal imagery and the inability to employ concrete (especially visual concrete) imagery among a selected group of intellectual men whom he studied by means of this questionnaire. Such a result is one, however, which we believe Galton might well have anticipated. With education we have a shift from dealing almost solely with concrete things to dealing with more and more abstract materials. It is possible to have an imaginal representation of an abstract concept in the form of a concrete image,—we know of just one such case,—but the usual form of such an abstract representation is in some verbal form. Hence in abstract thinking we have a greater and more frequent use of the verbal forms of imagery. Mere casual introspection will verify this fact which is also

⁷ E. Meumann. *The Psychology of Learning*. (Trans. by J. W. Baird.) New York, 1913, p. 179ff.

⁸ F. Galton. *Inquiries into Human Faculty and its Development* New York, 1883, p. 86ff.

clearly brought out by numerous careful experimental introspective studies.⁹

Let us now see how these concepts may be applied to an explanation of the various criticisms that have been brought forward against the localization theories of aphasia. In the first place, the fact that apparently similar lesions will show widely different symptom complexes is readily explained largely on a mere extension of the explanation advanced by Charcot himself. As an example, let us take definite cases whose imaginal type has been carefully and systematically studied. A former student of this laboratory, Dr. R. H. Wheeler, now Assistant Professor of Psychology, University of Oregon, is very strongly of the visual type. Visual images, both concrete and verbal, are largely employed in his thinking and in his recalling of past experiences. It is he, indeed, who frequently has a concrete visual imaginal representation of an abstract concept. Verbal motor and auditory (both concrete and verbal) images are also employed by him but not nearly to the same extent as the visual modality. If he wishes to recall a forgotten word it will almost always occur first as a visual verbal image, either of the printed word or of the word written in his own handwriting.

My own case is the other extreme. I do not remember ever having had a clear and durable visual image. Fleeting, non-focal and unclear visual images sometimes come into consciousness, but their occurrence is exceedingly infrequent and, when they occur, such images are always accompanied by a complex of other images so that I believe that their presence in consciousness is entirely non-essential. I do not remember ever having had a visual verbal image of any sort. My thinking is carried on almost entirely in terms of verbal motor images and motor and auditory concrete images,—all of which are very clear, durable, and of frequent occurrence.

We have chosen two cases of extreme variation but both subjects have been carefully studied and a description of their conscious contents appears elsewhere in the literature.¹⁰ Con-

⁹ E. O. Finkenbinder. The Remembrance of Problems and of their Solutions. *Amer. Jour. of Psychol.*, XXV, 1914, 32-81. E. L. Woods. An Experimental Analysis of the Process of Recognizing. *Amer. Jour. of Psychol.*, XXVI, 1915, 313-387. S. C. Fisher. The Process of Generalizing Abstraction; and Its Product, the General Concept. *Psychol. Mono.*, No. 90, 1916, v. 213. S. C. Fisher. An Analysis of a Phase of the Process of Classifying. *Amer. Jour. of Psychol.*, XXVIII, 1917, 57-116.

¹⁰ See the articles enumerated in footnote 9.

sider, then, the tremendous differences that would result in the symptom complexes in these two cases from a similar localized cortical lesion. If this lesion involved the visual verbal center, the loss in the case of Professor Wheeler would be exceedingly profound; while, in my own case, I am convinced that there would be little perceptible loss in my ability to handle the language functions. If the localized lesion were in the motor verbal center, both of us would sustain a loss in our ability to handle the language functions, but the loss would be very much more profound in my own case than in that of Professor Wheeler. I am convinced that a lesion in the verbal motor center would practically deprive me of the use of language in any form. This is true for both speaking and the understanding of spoken and written language as I find an almost universal use of accompanying verbal motor images in my reading and listening to difficult spoken language. There is also, in my own case, almost invariably concomitant verbal motor imagery when I write. We therefore believe that differences in the imaginal type of individuals before the onset of the aphasic disturbance would account for any differences in symptom complexes which have been brought out in the literature as resulting from approximately similar cortical lesions.

The discussion of my own case, given above, brings us to a consideration of the second criticism of the localization theories,—the lowering of the general intelligence accompanying aphasic disturbances. We have pointed out above that the experimental testimony all emphasizes the importance and frequent occurrence of verbal processes in our thinking and in the rest of our so-called higher intellectual processes. Indeed, for most of us, the representation of abstract ideas, with which our higher thinking is so largely concerned, cannot or at least is not present to consciousness in concrete form. This representation of abstract ideas seems to be entirely carried on in terms of verbal images of one modality or other. Hence any impairment of the ability to handle verbal images will *ipso facto* be accompanied by an impairment of the ability to handle the abstract concepts which are so essential to thinking. And, furthermore, we may expect wide individual differences in the extent to which the general intelligence will be impaired, depending on both the imaginal type of the individual before the onset of the disease and on the nature of the lesion. Let us again consider the cases of Professor Wheeler and of myself. It may be believed that a lesion in the visual verbal cen-

ter would result in a considerable lowering of Professor Wheeler's general intelligence; while such a lesion would have but little effect in my own case. On the other hand, a lesion in the motor verbal center would have the effect of lowering Professor Wheeler's general intelligence to a much less extent than one in the visual verbal center. But a lesion in the verbal motor center in my own case would have a most profound effect in lowering my general intelligence.

Let us next consider the question of recovery. We find individuals who are at one time profoundly affected but who later either partially or wholly regain the power of understanding or using language. Such a recovery may, of course, be explained in some cases in terms of the resumption of function of some cerebral area which has not been actually destroyed, by the removal of pressure or the absorption of a blood clot, or what not. But such an explanation will not include all cases, and we find partial recovery in cases where post-mortem examination shows an actual destruction of tissue. Such a recovery,—and the cases in the literature do not show that these recoveries are ever complete,—must be explained on the basis of the vicarious functioning of some other area of the cortex. We will attempt to explain such vicarious functioning in psychological rather than in anatomical or neurological terms. The cases of Professor Wheeler and myself, where one single modality of imagery is so strongly emphasized, must be considered as extreme and very unusual cases. Most individuals are of decidedly mixed types and employ two or even three modalities of imagery to approximately the same extent. Now if one of these several usable modalities be eliminated, there will at first be a lowering of the ability to employ the language functions. But in time the individual will be able, through practice, to employ one of the other usable modalities of imagery, and, hence, the ability to handle language will be at least partially restored. The experimental evidence makes it appear very doubtful if we are ever able to train, to any great extent, any modality of imagery which was not readily usable before the disturbance.¹¹ Vicarious functioning in the sense of the taking over of the functioning of one modality by another which has not been employed to any

¹¹ Cf. E. B. Talbot. An Attempt to Train the Visual Memory. *Amer. Jour. of Psychol.*, VIII, 1897, 414-417. L. Witmer. A Case of Chronic Bad Spelling. *Psychol. Clinic*, I, 1907, 53-64. M. Fernald. The Diagnosis of Mental Imagery. *Psychol. Mono.*, No. 58, 1912, p. 82ff.

extent before the disturbance does not seem to be what happens. What we do have seems to be rather a shift of emphasis from the modality which has been lost to some other modality which itself was highly usable before the attack and which, now that it exists in practical isolation, takes on the function of the entire expression and understanding of language. Again on the basis of this concept, we might expect great individual differences in the extent of the recovery dependent upon the complexity of the imaginal types of the patients before the onset of the disease, with regard to both the number of usable modalities of verbal imagery and also to the intimacy of the relations between these modalities.

The qualitative aspect of the way that the various parts of speech are lost in cases of progressive aphasia and in old age is a fact which again we believe might have been anticipated. The clear distinction has been made between verbal and concrete imagery,—both of which forms may be of several modalities. We believe that with progressive total aphasia *all* language becomes increasingly difficult. Thus the use of all forms of verbal imagery becomes difficult, but we have no reason to believe that the use of concrete images has been impaired. However, in the earlier stages, it is still possible to recall and use the verbal images but these come to consciousness more slowly than heretofore, come with less spontaneity and, from the qualitative side, are less clear and focal, less intensive, and less durative. Imagine an individual in such a condition. If he wishes to recall a friend, or a clock or some other concrete object it is possible to get a perfectly satisfactory imaginal representation of that concrete object in concrete terms. It is not necessary to recall any verbal representation at all and, as such a verbal representation comes with great difficulty, the subject does not force himself to make such a recall as he already has a satisfactory representation of the object. But in the case of the abstract concept no concrete representation is possible except in rare cases, and so the subject has to force himself to recall the verbal representation. And the most abstract of all ideas are the interjections and conjunctions, ideas for which a concrete imaginal representation does not seem possible to us, and it is these parts of speech which are lost only finally and eventually when the language function itself is entirely lost.

Experimental work has shown that there are decided daily variations in a normal individual with regard to the spontaneity and clearness with which images occur in conscious-

ness. Some of the causes for such attributive changes in the normal subject are to be sought for in the influence of the weather, temperature, state of fatigue, and the general physiological condition. We believe that similar changes in the spontaneity, clearness, and intensity with which verbal images occur in consciousness may be expected in partial aphasics, in whom ability to use these images is not lost but only impaired. Indeed we would expect that the changes would be relatively more profound in the individual who has partially lost his ability to handle a certain type of imagery than it would be in the normal individual. And we believe that such variations in the occurrence of the attributive aspects of the image would account for the fluctuations of function reported by Franz.

Let us finally consider how this concept may explain certain apparently anomalous cases that have appeared in the literature. Let us consider only one case, that of the Russian General reported by Charcot. Before the attack this patient was able to speak Russian, French and German. After the attack he was unable to speak French and German while his ability to speak Russian was relatively unimpaired. Later this individual reacquired his ability to speak French but he never improved in German. Let us now consider a possible reconstruction of this case. In the first place we will assume that this individual was of a mixed visual and motor verbal type,—that he was able to use and did habitually use verbal images of both modalities. Let us now try and reconstruct the psychological basis for his acquisition of these three languages. Russian was learned in childhood and was undoubtedly learned in verbal motor fashion. French was the Russian Court language of the time and was taught in early childhood in both verbal motor and verbal visual fashion. Indeed when we consider the court conditions in Russia at the time, we may believe that probably a great deal of emphasis was laid on the writing of French as the court people of the time seldom wrote Russian at all. German was usually acquired much later than the French and with a strong emphasis on reading and very little on speaking the language. If the reader will grant the assumption that this individual was of the strongly mixed verbal visual and motor type, we may believe that the imaginal representations of these languages was about as follows:—Russian, almost wholly verbal motor; German, almost wholly verbal visual; and French, strongly mixed verbal visual and motor. Now if the destruction had been of the verbal visual center with its stock of images, we should expect

little impairment of the ability to handle Russian but total impairment of the German and great impairment of the French. But inasmuch as the French was already partially retained in the form of usable verbal motor images, one would expect a recovery of the use of that language,—due to the vicarious functioning of this other modality. This vicarious functioning, however, which must be considered rather as a change of emphasis from one already usable modality to another, rather than the assumption of a function of a modality which has been lost by some other modality which was not before usable.

All this, of course, is obviously the most extravagant sort of theorizing. We are not attempting to hold a brief for any particular theory of strict localization of the language functions. That schema must be supplied by the neurologists. We hope to have shown, however, that there are no valid theoretical reasons why such an envisagement of the problem is not proper and possible.

In order to answer the criticisms that have been offered, we have advanced the more modern concept of imaginal types and other experimental evidence of a psychological nature. This concept of imaginal types has made radical advances and sustained profound changes since its introduction by Charcot and by his pupil Ballet. But we believe that they were on the right track when they introduced this concept to explain the invalidity of the criticisms against a strict localization view of aphasia.

This matter of the possible effect of imaginal type of the individual upon the aspects of aphasic disturbance cannot be decided until we have clinical observations upon some individuals whose imaginal types have been well known and completely studied before the onset of the disease. A half dozen such cases would clear up the matter to a great extent and would go a long way toward either proving or invalidating our present contentions. Unfortunately it is usually not possible to obtain much information about the normal imaginal type of an individual by the time that he gets into the hands of the clinician. There are several reasons for this. The average man of the world usually does not know anything about his imaginal type, and so questioning in the hands of the clinician brings out merely the modalities which the subject could use voluntarily and not those which he habitually employed in his thinking. Secondly, the clinician cannot make tests of imaginal type after the subject gets into his hands because the

onset of the disease is either sudden or, if gradual, has progressed rather profoundly before he comes for examination. Hence this question may have to wait for solution until some introspective psychologists, whose types have been carefully studied and the results of such studies have appeared in the literature, have some aphasic disturbance so that we may study their symptom complexes and their prognosis and the history of the course of the disease in the light of their known imaginal types.